Fuel for our future

CUTEC NEWS

FACTS · INFORMATION · ANALYSES

No_2 www.cutec.de May 2003

Let's be ...!?

Please use your free association to complete the above line. What words came across your mind? Honest? Frank? Correct. That's exactly what I'm pointing to. Honesty, in words and in deeds, is just what I sometimes miss nowadays.

Well, let's be honest. "Environment" and "Conservation" are no longer the top themes, nor have they been for some time. Of course, Environmental Technology never claimed to be the king of all sciences. Instead, our responsibility lies in integrating environmental aspects "everywhere", and that means in everyday life too.

An example of this is the ever-increasing price of fuel for motor vehicles. Read this issue's key article on the ARTFUEL project, which is about the production of synthetic fuel from biomass.

So you'll understand that for us a production-integrated protection of the environment cannot always mean avoiding "end of the pipe" technology in all cases. Only a holistic consideration will lead to a solution which will make ecological sense and also be economically acceptable for everyone. The approach itself may be well known. However, the crucial, scientific question we have to answer is whether or not the existing procedures were thought through logically to the end. It might be that good ideas were given up and forgotten too quickly. It is up to us to present sound and applicable results within a short time.

This editorial closes with the game on words I started at the beginning. I hope I was able to convince you that we are being honest when we emphasise that CUTEC also takes care of the other fields which interface with environmental technology and will not neglect any area. What do you think?

Yours,
Otto Carlowitz

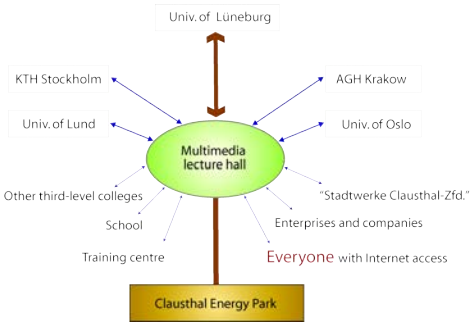
IN THIS EDITION

Multimedia lectures in CUTEC

Integration of the Energy Park into International Education

The Clausthal Energy Park set up at the CUTEC institute represents a pioneering platform for the application of regenerative energy systems. The project is being grant-aided as a teaching and demonstration facility by the German Federal Foundation for the Environment. To ensure that the use is not restricted to Clausthal only, a joint application from the Technical University of Clausthal and the University of Lüneburg was approved recently as part of a multimedia innovation offensive by the state of Lower Saxony. With the new multimedia equipment, the Energy Park can be included in the instruction and training offered in the international course of studies "Energy-Management (BA)". The Energy Park can be accessed on several levels.

- Web cameras and audio modules facilitate an audiovisual on-line observation of the Energy Park components on the Internet
- With the aid of suitable "video conference technology", operations can be co-ordinated with the energy park's dispatcher and followed over normal Internet access.
- Complete access to the energy park is used within the framework of tele-lectures. This is possible because of a special connection between the CUTEC lecture hall and the energy park's control system. Further multimedia components render the lecture hall capable of a complete transfer of "teleteaching events" by video and data channels to suitably equipped multimedia lecture halls. (wh)



Teleteaching in the CUTEC lecture hall

3rd International Conference in Goslar on Wastewater Meets with Enthusiasm

From 18th to 22nd May 2003, Goslar will host the conference "Oxidation Technologies for Water and Wastewater Treatment".

The conference, which is held every 3 years, is organised by CUTEC and the Technical University of Clausthal (TUC) and presents state-of-the-art technology in water and wastewater treatment to participants from the fields of science, economy and administration. More than 140 selected presentations of current applications and results from research and development will form the platform for a productive sharing of ideas and experience between internationally renowned experts from all five continents.

Thanks to financial support by the German Federal Foundation of Environmental Concerns (DBU), it is possible for specialists from third world countries to take part in this forum. In combination with tours of industrial operations this will show the efficiency of German environmental technology.

Within the context of the "Water Year 2003" declared by the United Nations, ways will be shown for managing water and wastewater problems. (kra)

High-calibre meeting of Experts:

Focus on Biotechnology and High Temperature Engineering

Biotechnology is becoming increasingly important and this trend is impressively reflected in the successful activities undertaken by CUTEC. The fourth workshop of the "Environment" group of specialists was held in co-operation with "BioRegioN", the Lower Saxon biotechnology network. The main focus of this event was on the possible applications of Biotechnology in Waste Management. Speakers from science and industry presented up-to-date results on the current stage reached in technology and the prospects offered by the potential of new methods, e. g. the possibility of extracting phosphate from refuse and the application of innovative processes to reduce the quantity of sewage sludge. Dr. Arno Cordes, the head of the group, explained that the group's aim was a more rapid implementation of new technologies in practice.

Interested seminar participants in the CUTEC lecture hall

Under the aegis of "Environmental Protection and Environment Process Engineering", the "high-temperature technology" committee, Association of German Engineers - Sub-Organisation of Process and Chemical Engineering (VDI-GVC), is working on multidisciplinary issues, e.g. in the areas of power station technology, combustion and the utilization of residues. The aims are the increased use of efficient high temperature procedures, with temperatures starting at 500 °C, and the improvement of the processes already in use in industrial applications, leading to application-oriented processes and products which will meet ecological requirements at low costs. In presentations and on site visits, the hosts TUC and CUTEC have demonstrated their capabilities in these areas and shown themselves to be competent contacts for the seminar participants. (kra)

Introduction of the Soil Protection and Landfill Technique Team

The soil protection team makes an active scientific contribution to the CUTEC business segment of waste recycling and disposal. In organisational terms it belongs to the department of physical and biological processes. Since the foundation of the institute, the team has advanced continuously. More than 80 successful projects prove its competence and testify to a growing demand.

Simulation reactor for determining solids' depositing characteristics

This has been made possible not least through a consistent forward-looking adaptation to the market. At the beginning, the focus was on issues of processing contaminated refuse dumps, including tasks such as recording and evaluating risks. In addition, landfill and geotechnical projects were also carried out within the context of waste management concepts.

Numerous landfill technology projects, including international projects such as the current co-operation with Technion Haifa testify to a growing expertise. Germany's recognised high standard of knowledge in the field of waste disposal is shown through international projects and this increases market opportunities.

Today the focus is on soil protection, especially the preventing of contamination and the treatment after pollution. A good example of this is the current project undertaken by the German Federal Ministry of Education and Research (BMBF) "Prognosis of the release of pollutants from leachate water into groundwater".

The close co-operation with the institutes for Landfill Technology and Treatment, Analytical and Inorganic Chemistry, as well as Mineralogy and Mineral Raw Materials in the Technical University of Clausthal testifies to the high level of interdisciplinary activity in the projects and this is particularly suitable for handling overlapping themes of sustainability with regard to soil, ground water and mineral raw materials.

In terms of facilities, the group has laboratories and laboratory equipment for sampling and for physical characterisations (solids). In addition, it also has the benefit of the house's good infrastructure. Furthermore, tests can be carried out by university partners in well-established co-operations. The group consists at present of three scientists, a technician and auxiliary scientists. (ze)

ARTFUEL

The Production of Synthetic Fuel from Biomass

ARTFUEL is the synonym for "artificial fuels", which is a research and development project in which artificial high-performance fuel is to be produced from biomass. The aim here is to produce kerosene-type fuel for future engine concepts; traditional fuels such as gasoline and diesel are produced also. The research and development project is regarded by university and industrial experts, for example VW, as having a very high innovation potential. The ministries of Lower Saxony, in particular the Ministry of the Environment and the Ministry of Agriculture, share this opinion and are providing a total of 1.24 million EURO to finance the construction and operation of a 1-megawatt plant as part of a two-year R&D project. The process chosen and further developed by CUTEC and the required technology are complex: the chain begins with the preparation and conditioning of biomass for fluidised bed gasification, the gasification then follows in the fluidised bed itself, during which the biomass at 850 °C to 950 °C and subject to the injection of steam is decomposed into the gases hydrogen (H_2) and carbon monoxide (CO) in particular. Undiserable accompanying substances like dust and sulphur-, chlorine- and tar compounds have to be removed from the raw product gas. The conditioned gas is then converted into hydrocarbons in the Fischer-Tropsch process. The resulting products are separated into fuel fractions (kerosene, petrol, diesel) and higher hydrocarbons. The higher hydrocarbons are converted in a further process stage into fuel-like hydrocarbons. By influencing the process parameters, it is possible to produce the required product.

Although a lot of basic processes in this method are familiar from coal gasification, the complete process has never been implemented as yet. Furthermore, there is a clear need for research and development with regard to the input of energy into the reactor, the elimination of tar, gas conditioning and catalytic synthesis and their subsequent processes. It is important for the process balances that different forms of vegetable biomass – e.g. wood, straw or energy crops – can be utilized up to 100%.

With this technology concept, CUTEC – along with its industrial partners – will become one of Europe's four know-how carriers for complete plants for synthesising fuel from biomass. CUTEC will be particularly active here in the management and further development of technology and therefore always operate as a research and development institute with the aim of leading small and medium-sized enterprises in Lower Saxony into this market as well. The positive aspects for agriculture in Lower Saxony in the future – with the agriculture farmer as an energy farmer and his fields as "oil fields" – cannot be estimated at this time but they must be regarded as far-reaching and perhaps even structure altering.

The know-how held by the experts in the CUTEC team and the institute's excellent infrastructure are alone sufficient to permit the project to be implemented in Lower Saxony within the available financial means. The system's basic engineering has been concluded and work is now being done on the detail engineering.

Periphery of the FISCHER-TROPSCH- / hydroprocessing pilot system

Reactor from the FISCHER-TROPSCH- / hydroprocessing pilot system

Clearly definable system parts are being built up at present and existing system parts are being converted and prepared for integration into the overall system. The R&D facility will prospectively start trial operation at the end of 2003. (les/my)

IMPRINT

Publisher: CUTEC-Institut GmbH
Editor: Dr. T. Heere
Authors:
Prof. Dr.-Ing. O. Carlowitz (ca)
Dr.-Ing. B. Kragert (kra)
PD Dr. H. Lessing (les)
Dipl.-Chem. M. Maly (my)
Dr.-Ing. C. Schröder (schr)
Dr.-Ing. E.-A. Wehrmann, IEE of TUC (wh)
Dr. T. Zeller (ze)
Layout and setting G. Wessels
Production and supply:
CUTEC-Institut GmbH
Leibnizstr. 21+23
38678 Clausthal-Zellerfeld
Phone +49 05323 933-0
Fax +49 05323 933-100
E-Mail: cutec@cutec.de
Internet: www.cutec.de
Publication:
Several issues per year in irregular order. The issues can be ordered at the a.m. supply address.

New Members in the Team: Dr. Vodegel and Mr Major New Duties: Mr Bauer

Dr.-Ing. S. Vodegel

Since 1st April 2003 Dr.-Ing. Stefan Vodegel leads the department of "Thermal Processes". In taking on this position he is the successor to Dr.-Ing. Ragnar Warnecke, who moved to power station industry. Dr. Vodegel studied Chemical Engineering at Dortmund University. He attained a doctorate with a thesis on the sintering of Al_2O_3 by application of microwaves. A subsequent post-doctorate fellowship at German Research Foundation (DFG) brought him to England. From 1996 to 1999 he worked in the Deutsche Babcock Anlagen GmbH in Oberhausen. There he was responsible for implementing a program on producing models of the Babcock flue gas cleaning system. He then assisted and guided the experimental programmes on commissioning the refuse incineration plant in Köln. Since 1999 he worked for the Rethmann Entsorgungswirtschaft (Lünen) and their subsidiaries in the field of thermics, Combustion, Engineering, Services and Technology (CES-TEC), where he planed new power station engineering plants, created concepts for reinvestigations for existing thermal plants and handles projects in waste disposal and energy technology. In addition, Dr. Vodegel has carried out various audits in refuse incineration plants for the privatisation of waste disposal companies.

Eugen Major, already qualified in mine surveying, started work as a network administrator in the department of "data processing systems, graphics and media technology" on 1st February 2003. During a practical work experience placement as part of his training while studying to become an IT specialist at the "Prager-Schule" in Goslar – well-known to CUTEC colleagues from 2002 – he already had the opportunity to become familiar with the EDP operating sequences used here.

On 1st January, 2003, Ralf Bauer took on the post of deputy manager of the mechanical workshop. On the 1st November 2004 the present manager, Henry Nettelmann, will enter into partial retirement – availing of the older employees' part-time work model. In the present transitional period, Mr Bauer has already taken on project-related responsibilities. (kra

Report by the Works Council

In addition to representing colleagues, the works council is currently preparing the next works meeting. Highlights in the works council's report on the activities of the last months will be new personnel appointments and the effects of the new collective wage agreement. In addition, information was provided on the restructured pension scheme in public service. An informative talk on the changes planned by the legislators with respect to protection against dismissal and the termination of sectoral collective wage agreements is on the agenda of the works meeting. The Managing Director, Prof. Carlowitz, will report on the current positive situation at CUTEC. (ze)

Mr Kulkarni is doing good work

As a young junior scientist, Mr Sunil Kulkarni came to Germany from India to do research work for a two-year period as part of the programme supported by the Ministry of the Economy and Culture. He is integrated in the sewage treatment team and successfully works on environment-related analytical chemistry and anaerobic sludge treatment in connection with membrane technology. (schr)

A Portrait of the Members of the Scientific Advisory Board: Prof. Dr.-Ing. Friedrich-Wilhelm Bach

The name of Friedrich-Wilhelm Bach is closely linked to that of the Institute of Materials Science of the University of Hannover. Born in 1944 in Bleckede on the Elbe, he became a mechanical engineer and wholeheartedly made Hannover, Expo city and capital of the state of Lower Saxony, the centre of his work. Having graduated in 1972, he first worked as staff scientist and assistant and after attaining a doctorate in 1978, took on the post of chief engineer at the institute. From 1981-1997 he headed the department of materials technology and attained a postdoctoral lecturing qualification in 1983 in the field of materials technology. In 1987 he was appointed "supernumerary professor" at the University of Hannover and in 1991 he was entrusted with the management of the "Hanover Underwater Technology Centre" and in 1992 with the management of the research and training centre "Underwater Technology and Environment Engineering" in the Hanseatic League City of Greifswald. In 1997 the University of Dortmund offered him the chairmanship of Materials Technology from which in 2001 he returned as a director to "his institute" in Hannover. Numerous memberships in technical associations, diverse activities in international scientific institutions and committees reflect the broad spectrum of his commitment. Prof. Bach has approximately 330 publications to his credit and he holds 20 patents. With respect to CUTEC, he sees his task "in contributing his knowledge and experience, in particular in the fields of materials technology and environmental technology and so helping to shape the scientific direction, because the CUTEC functions are of elementary interest to the general population". (kra)

Prof. Dr.-Ing. F.-W. Bach

DATES:

- 3rd international Conference on Water and Wastewater Treatment on 2003-05-18 / 2003-05-22, Goslar
- CUTEC presentation at the ACHEMA on 2003-05-19 / 2003-05-24, Frankfurt
- Autumn 2003 Grand opening of the "Clausthal Energy Park" with the new hall